

Course syllabus
Department of Civil Engineering, Indian Institute of Technology Madras

CE5043 - GIAN 151003L10 – Building Resilient and Sustainable Roadway Infrastructure.

Credit Distribution: C:6 L:2 T:0 P:0 E:0 O:4 TH:0

Course Type: Theory

Description: The Objectives of the subject are 1. Understanding of the impacts of road construction on climate change 2. Understanding of the various methods and technologies of building sustainable roads 3. Knowledge dissemination on selection of appropriate method and techniques to build and maintain sustainable and resilient roadway infrastructure. 4. An understanding of climate change projections 5. Ability to utilize available data to evaluate the risk of extreme events and climate change on the roadway infrastructure.

Course Content: Climate Change and Pavement Performance: Introduction to climate change, pavements as climate change contributors and mitigators, response of pavements, adaptation, recommendations, Climate Change Scenarios and Effects on Transportation Infrastructure Systems. Overview of sustainable road construction methods: Requirements of sustainable road pavement construction, emerging technologies, life cycle cost analysis of pavements, applications of life cycle cost analysis to network level highway pavement management, Estimation of GHG emissions from highways. Sustainable Pavement management: Decision support tools, sustainable pavement preservation and maintenance practices, permeable pavements, warm mix asphalt, recycling of pavement materials, full depth reclamation. Energy Harvesting from Pavements: Energy characteristics of pavement materials, energy collection and transmission techniques, evaluation of usefulness. Overview of Extreme Events and Climate Change Related Events: Evaluating risks of extreme weather events and climate change phenomenon the roadway infrastructure, systems approach in evaluation of resiliency, Different approaches for building a resilient roadway infrastructure Case Studies: Sustainable pavement construction techniques, resilient transportation infrastructure in towns, cities and states, performance and experience.

Text Books

- The Science and Technology of Climate Change, Energy, Sustainability and Pavements, Kasthurirangan, Gopalakrishnan, Wyanand JvdM Steyn John Harvey Editors, 2004.

Reference Books

- Relevant publications/codes from Federal Highway Administration, AASHTO, PIARC and Indian Roads Congress, Transportation Research Board, National Institute of Standards and Technology, Sandia National Laboratories and US Army Corps of Engineers.

Prerequisite: NIL